Name:

## at1124exam: Radicals and Squares (v830)

### Question 1

Simplify the radical expressions.

| $\sqrt{12}$ | $\sqrt{75}$ | $\sqrt{18}$ |
|---|---|---|
| $\sqrt{2 \cdot 2 \cdot 3}$ | $\sqrt{5 \cdot 5 \cdot 3}$ | $\sqrt{3 \cdot 3 \cdot 2}$ |
| $2\sqrt{3}$ | $5\sqrt{3}$ | $3\sqrt{2}$ |

### Question 2

Find all solutions to the equation below:

$$2\left((x+5)^2+9\right) \;=\; 90$$

First, divide both sides by 2.

$$(x+5)^2+9=45$$

Then, subtract 9 from both sides.

$$(x+5)^2=36$$

Undo the squaring. Remember the plus-minus symbol.

$$x+5=\pm 6$$

Subtract 5 from both sides.

$$x=-5\pm 6$$

So the two solutions are $x=1$ and $x=-11$.

**Question 3**

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 12x = -27$$

$$x^2 + 12x + 36 = -27 + 36$$
$$x^2 + 12x + 36 = 9$$
$$(x+6)^2 = 9$$
$$x + 6 = \pm 3$$
$$x = -6 \pm 3$$
$$x = -3 \quad \text{or} \quad x = -9$$

**Question 4**

A quadratic polynomial function is shown below in standard form.

$$y = 3x^2 - 24x + 40$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 - 8x) + 40$$

We want a perfect square. Halve -8 and square the result to get 16 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 - 8x + 16 - 16) + 40$$

Factor the perfect-square trinomial.

$$y = 3((x-4)^2 - 16) + 40$$

Distribute the 3.

$$y = 3(x-4)^2 - 48 + 40$$

Combine the constants to get **vertex form**:

$$y = 3(x-4)^2 - 8$$

The vertex is at point $(4, -8)$.